



1  
00:00:07,170 --> 00:00:09,420  
This Week at NASA...

2  
00:00:09,420 --> 00:00:12,340  
“Splash down, splash down.”

3  
00:00:12,340 --> 00:00:17,340  
The SpaceX Dragon capsule that splashed down  
Sunday in the Pacific off Mexico’s Baja

4  
00:00:17,340 --> 00:00:20,590  
California coast is back on dry land.

5  
00:00:20,590 --> 00:00:24,900  
Its recovery ship returned the spacecraft  
to San Pedro, California, laden with more

6  
00:00:24,900 --> 00:00:29,480  
than 3-quarters of a ton of cargo from the  
International Space Station.

7  
00:00:29,480 --> 00:00:33,410  
Much of what Dragon brought back was from  
science experiments conducted on the station

8  
00:00:33,410 --> 00:00:39,280  
that’ll benefit us here on Earth, as well  
as provide critical data about how long-duration

9  
00:00:39,280 --> 00:00:41,920  
spaceflight affects the human body.

10  
00:00:41,920 --> 00:00:46,470  
Not since the space shuttle have NASA and  
its international partners been able to return

11  
00:00:46,470 --> 00:00:51,110  
considerable amounts of research and samples  
to Earth for analyses.

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00:00:51,110 --> 00:00:57,850

“Suni you’re going to remove the cover carefully and restrain it on the Nadir side.”

13

00:00:57,850 --> 00:01:03,980

Back on, or, outside the ISS, Expedition 33 Commander Suni Williams of NASA and Flight

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00:01:03,980 --> 00:01:08,299

Engineer Aki Hoshide of the Japan Aerospace Exploration Agency “went EVA.”

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00:01:08,299 --> 00:01:13,729

The pair bypassed an ammonia leak in one of the station’s coolant lines.

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00:01:13,729 --> 00:01:18,320

The leak, which began slowly in 2007, had grown recently.

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00:01:18,320 --> 00:01:23,640

The spacewalk was the 166th on the station, and the third since August by Williams and

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00:01:23,640 --> 00:01:26,900

Hoshide.

19

00:01:26,900 --> 00:01:31,920

Space Shuttle Endeavour debuted at its temporary display pavilion in a grand opening ceremony

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00:01:31,920 --> 00:01:35,810

hosted by the California Science Center in Los Angeles.

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00:01:35,810 --> 00:01:39,700

Endeavour will make its permanent home at the Samuel Oschin Air and Space Center now

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00:01:39,700 --> 00:01:42,020  
under construction at the CSC.

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00:01:42,020 --> 00:01:47,100  
Among those attending the ceremony were astronauts,  
public officials and local school children,

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00:01:47,100 --> 00:01:51,689  
many of whom it's hoped will be inspired  
by Endeavour to join our next generation of

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00:01:51,689 --> 00:01:54,749  
explorers and scientists.

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00:01:54,749 --> 00:02:02,290  
Meanwhile, Atlantis, the last NASA space shuttle  
to fly in space, also became the last to be

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00:02:02,290 --> 00:02:04,280  
officially retired.

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00:02:04,280 --> 00:02:08,330  
Beginning at the Kennedy Space Center's  
Vehicle Assembly Building, Atlantis rolled

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00:02:08,330 --> 00:02:14,430  
the ten miles to the KSC Visitor Complex where  
it will go on permanent public display.

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00:02:14,430 --> 00:02:17,890  
The orbiter stopped along the route for its  
retirement ceremony.

31

00:02:17,890 --> 00:02:23,510  
"America still leads the world in exploration  
and we're building on the many fine accomplishments

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00:02:23,510 --> 00:02:28,819  
of the space shuttle program to take us where

we have not gone before, to places where our

33

00:02:28,819 --> 00:02:35,020

imagination and our aspiration tells us we  
can go if we channel the passions that built

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00:02:35,020 --> 00:02:37,590

and launched Atlantis and create a new day.”

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00:02:37,590 --> 00:02:46,099

“It is my sincere hope that one day some  
young boy or girl is going to look at Atlantis

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00:02:46,099 --> 00:02:50,620

and it’s going spark that dream of exploration  
in space.”

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00:02:50,620 --> 00:02:53,140

NASA retains Atlantis’s title.

38

00:02:53,140 --> 00:02:58,019

The public can see it at the visitor complex,  
where a grand opening for Atlantis’s new

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00:02:58,019 --> 00:03:01,409

“space” is planned for next July.

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00:03:01,409 --> 00:03:07,549

Meanwhile, the Kennedy Space Center continues  
its modernization and refurbishment as the

41

00:03:07,549 --> 00:03:09,870

spaceport of the future.

42

00:03:09,870 --> 00:03:16,159

The large space shuttle-era work platforms  
have been removed from high bay 3 of Kennedy’s

43

00:03:16,159 --> 00:03:17,610

Vehicle Assembly Building.

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00:03:17,610 --> 00:03:22,269

That's part of the center-wide effort to accommodate NASA's Space Launch System and

45

00:03:22,269 --> 00:03:24,400

a variety of other spacecraft.

46

00:03:24,400 --> 00:03:31,220

When updating is complete, KSC will safely process, assemble, transport and launch NASA's

47

00:03:31,220 --> 00:03:35,769

next generation of rockets and spacecraft.

48

00:03:35,769 --> 00:03:40,790

NASA researchers, project managers and program leads gathered in Huntsville for the first

49

00:03:40,790 --> 00:03:44,180

annual review of the Technology Demonstration Missions.

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00:03:44,180 --> 00:03:49,640

TDMs bridge the gap between laboratory development of revolutionary, cross-cutting technologies

51

00:03:49,640 --> 00:03:52,599

and their practical demonstration in the space environment.

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00:03:52,599 --> 00:03:57,280

"These accomplishments included the MEDLI experiment that flew in on the Mars Science

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00:03:57,280 --> 00:04:03,489

Laboratory, the Human Exploration Robotic Technology experiment on space station that

54  
00:04:03,489 --> 00:04:09,569  
was the Robonaut and the Spheres demonstration  
and several other accomplishments that we

55  
00:04:09,569 --> 00:04:10,569  
had.”

56  
00:04:10,569 --> 00:04:15,170  
Hi, I'm David Bish, co-investigator on the  
CheMin instrument on the Mars Science Laboratory

57  
00:04:15,170 --> 00:04:17,920  
and this is your Curiosity rover update.

58  
00:04:17,920 --> 00:04:21,030  
We have been spending some time in an area  
called Rocknest, and this week we delivered

59  
00:04:21,030 --> 00:04:23,220  
a scoop of a dune to Curiosity.

60  
00:04:23,220 --> 00:04:28,860  
CheMin performs X-ray diffraction measurements  
on powdered rocks and soil samples.

61  
00:04:28,860 --> 00:04:32,670  
An X-ray diffraction is the best method for  
telling us what minerals are present in a

62  
00:04:32,670 --> 00:04:37,130  
rock or a soil because it is sensitive to  
the arrangements of atoms in minerals.

63  
00:04:37,130 --> 00:04:42,100  
As the X-rays strike the soil sample, CheMin  
shows us how mineral crystals distinctively

64  
00:04:42,100 --> 00:04:47,310  
interact with X-rays, and this image shows

us our first X-ray diffraction results.

65  
00:04:47,310 --> 00:04:51,970  
The diffraction signals appear on the detector as rings that represent the fingerprint of

66  
00:04:51,970 --> 00:04:53,380  
the minerals.

67  
00:04:53,380 --> 00:04:57,320  
The rings tell us not only what minerals are present in the soil and but also how abundant

68  
00:04:57,320 --> 00:04:58,510  
they are.

69  
00:04:58,510 --> 00:05:03,850  
The CheMin data provide us distinctive signatures of the minerals plagioclase feldspar, pyroxenes,

70  
00:05:03,850 --> 00:05:04,850  
and olivine.

71  
00:05:04,850 --> 00:05:07,100  
Peridot is a variety of olivine.

72  
00:05:07,100 --> 00:05:11,430  
Just keep in mind that the olivine in the soil sample is much smaller than these crystals.

73  
00:05:11,430 --> 00:05:16,080  
Roughly half of the soil consists of poorly crystalline material, such as volcanic glass.

74  
00:05:16,080 --> 00:05:20,660  
Thus, this Martian soil appears very similar to some weathered basaltic soils that we see

75  
00:05:20,660 --> 00:05:24,480

on Earth, in places like the flanks of Mauna Kea, Hawaii.

76  
00:05:24,480 --> 00:05:28,630  
You can appreciate how revolutionary CheMin is when you consider that instruments of this

77  
00:05:28,630 --> 00:05:33,260  
type on Earth are typically about the size of a double-wide refrigerator and the CheMin

78  
00:05:33,260 --> 00:05:37,480  
instrument on the Mars Science Laboratory is about the size of a shoebox.

79  
00:05:37,480 --> 00:05:42,190  
CheMin has been modified for use on Earth in places such as Antarctica and the Arctic.

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00:05:42,190 --> 00:05:46,900  
It's also been applied for detection of counterfeit pharmaceuticals around the world

81  
00:05:46,900 --> 00:05:52,340  
and a modification of the instrument has been used in archeological studies to help us understand

82  
00:05:52,340 --> 00:05:54,850  
the nature of surfaces and how might we protect them.

83  
00:05:54,850 --> 00:05:59,210  
In the coming weeks and months, we're excited to measure more X-ray diffraction data on

84  
00:05:59,210 --> 00:06:02,680  
soils and rocks to tell us more about the geology of Gale Crater.

85  
00:06:02,680 --> 00:06:05,430

This has been your Curiosity rover report.

86

00:06:05,430 --> 00:06:09,310

Stay tuned for further updates.

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00:06:09,310 --> 00:06:14,180

Marshall Space Flight Center astrophysicist  
Dr. Chryssa Kouveliotou has been selected

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00:06:14,180 --> 00:06:19,030

by Time Magazine as one of the twenty-five  
most influential people in space.

89

00:06:19,030 --> 00:06:25,990

A NASA astrophysicist since 2004, Kouveliotou  
is an associated scientist of NASA's Swift

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00:06:25,990 --> 00:06:32,250

mission; a member of the NuSTAR Science Team;  
and, co-investigator on the Gamma-ray Burst

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00:06:32,250 --> 00:06:37,290

Monitor, an instrument flying aboard NASA's  
Fermi Gamma-ray Space Telescope.

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00:06:37,290 --> 00:06:44,300

As for Fermi, astronomers using data from  
the Gamma-ray Space Telescope have made the

93

00:06:44,300 --> 00:06:49,240

most accurate measurement of starlight in  
the universe and used it to establish the

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00:06:49,240 --> 00:06:53,620

total amount of light from all the stars that  
have ever shone.

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00:06:53,620 --> 00:06:58,030

Light from stars that have stopped shining  
still travels throughout the universe, creating

96

00:06:58,030 --> 00:07:00,270

a sort of cosmic fog.

97

00:07:00,270 --> 00:07:06,360

By measuring average amounts of gamma radiation generated by black-hole-fueled galaxies traveling

98

00:07:06,360 --> 00:07:12,330

through this fog over the past 9-point-six billion years, astronomers can estimate the

99

00:07:12,330 --> 00:07:14,720

fog's thickness, or density.

100

00:07:14,720 --> 00:07:19,110

That comes to 1-point-4 stars per 100 billion cubic light years.

101

00:07:19,110 --> 00:07:26,640

Or, in other words, the average distance between each star is 4,150 light years.

102

00:07:26,640 --> 00:07:32,280

The Visitor Center at Goddard Space Flight Center is celebrating its newest exhibit --- a

103

00:07:32,280 --> 00:07:36,240

replica of the Lunar Reconnaissance Orbiter that is circling the moon.

104

00:07:36,240 --> 00:07:41,140

The LRO team at Goddard spent more than a year refurbishing this mechanical prototype

105

00:07:41,140 --> 00:07:46,430

to make it look exactly like the spacecraft in orbit – right down to the thermal blankets.

106

00:07:46,430 --> 00:07:48,980

"This is a wonderfully exciting day.

107

00:07:48,980 --> 00:07:55,960

It's an exhibit that tells the LRO story and NASA's story very well and we expect

108

00:07:55,960 --> 00:08:01,270

that this will be a real attraction for visitors to Goddard."

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00:08:01,270 --> 00:08:06,190

The interactive exhibit allows visitors to browse the images LRO has captured, learn

110

00:08:06,190 --> 00:08:08,410

about the mission and meet the team.

111

00:08:08,410 --> 00:08:14,250

Launched in 2009, LRO has captured some of the most detailed images ever taken of the

112

00:08:14,250 --> 00:08:19,430

lunar landscape providing scientists with critical data about Earth's closest neighbor.

113

00:08:19,430 --> 00:08:26,640

"It's not a place that, you know, we've been there and that's it.

114

00:08:26,640 --> 00:08:34,370

It's a place that we need to continue to explore and learn about because it can tell

115

00:08:34,370 --> 00:08:36,630

us so much about our entire solar system."

116

00:08:36,630 --> 00:08:42,349

The information LRO is returning will help scientists identify resources for future exploration

117

00:08:42,349 --> 00:08:47,310

and scientific research of the moon.

118

00:08:47,310 --> 00:08:53,930

Thirty-nine years ago, on November 3, 1973,  
Mariner 10, the seventh successful launch

119

00:08:53,930 --> 00:08:58,670

in the Mariner series of spacecraft, was sent  
into space at the Cape Canaveral Air Force

120

00:08:58,670 --> 00:09:00,620

Station in Florida.

121

00:09:00,620 --> 00:09:06,230

Mariner 10 became the first spacecraft to  
visit Mercury, the first to use the gravitational

122

00:09:06,230 --> 00:09:12,730

pull of one planet to reach another and the  
first to visit two planets, Mercury and Venus.

123

00:09:12,730 --> 00:09:18,860

Mariner 10 measured each planet's environment,  
atmosphere, surface, and body characteristics.

124

00:09:18,860 --> 00:09:24,800

Data from Mariner 10 was used to help plan  
NASA's current MESSENGER mission.

125

00:09:24,800 --> 00:09:26,810

And that's This Week @NASA.